

Claims

1. A electrically conductive patterned film comprising carbon nanotubes wherein said film has a transparency and an electrical resistivity.
2. The film of claim 1, wherein transparency is greater than 65%.
3. The film of claim 1, wherein transparency is greater than 85%.
4. The film of claim 1, wherein transparency is greater than 95%.
5. The film of claim 1, wherein the electrical resistivity is less than 10^3 Ohms/square.
6. The film of claim 1, wherein the electrical resistivity is less than 10^2 Ohms/square.
7. The film of claim 1, wherein the electrical resistivity is less than 10^1 Ohms/square.
8. The film of claim 1, wherein the pattern is an integrated circuit.
9. The film of claim 1, wherein the pattern creates a polarizing effect for EM radiation that passes through said layer.
10. The film of claim 1, wherein the carbon nanotubes are selected from the group consisting of single-wall nanotubes, double-wall nanotubes, multi-wall nanotubes, chemically or physically modified nanotubes, and combinations and mixtures thereof.
11. The film of claim 1, further comprising conducting polymers, metals particulates, inorganic particulates, organometallic materials and combinations and mixtures thereof.
12. The film of claim 1, which is designed to transmit a range of the EM spectrum while shielding longer wavelengths.
13. The film of claim 1, wherein open spacing within said pattern permit radiation of $>1/2$ wavelength of incident radiation.
14. The film of claim 13, wherein incident radiation is from about 175 nm to 400 nm.
15. The film of claim 13, wherein incident radiation is from about 400 nm to 750 nm.
16. A transparent, electrically conductive film comprising:
a pattern of carbon nanotubes within said film, wherein said pattern provides an electrical resistivity of less than 10^3 ohms/square and a visible transmission of at least 75%.

17. The film of claim 16, wherein the pattern of carbon nanotubes is contacted to two substrates, one on each surface of the pattern.

18. A method of forming a transparent film of patterned electrically conductive carbon nanotubes comprising:

patterning a fluid containing carbon nanotubes on a transparent surface to allow for electrical conductivity across at least a portion of said surface and a visible transparency.

19. The method of claim 18, wherein the fluid is sprayed, inkjet printed, flow coated, or screen printed from liquid solutions containing the conductive materials.

20. The method of claim 18, wherein the electrical resistivity is less than 10^3 Ohms/square.

21. The method of claim 18, wherein the visible transmission is greater than 65%.

23. The method of claim 18, further comprising inclusion of a particulate material in said fluid.

24. The method of claim 23, wherein the particulate material is selected from the group consisting of silica, acrylic, glass, plastic, carbon black, beads, ceramics, metal and metal oxides, organic and inorganic materials, and combinations and mixtures thereof.

25. The method of claim 23, further comprising removing said particulate material and thereby enhancing optical transparency.

26. A electrically conductive patterned layer with enhanced transparency comprising:
 a pattern of conductive material with a combination of a thickness and a pattern, said combination determined by computing an electrical conductivity and a visible absorption coefficient against a plurality of degrees of patterning and a plurality of material thicknesses.

27. The layer of claim 26, wherein the conductive material is selected from the group consisting of graphite, gold, ITO, a metal, carbon nanotubes, and combinations and mixtures thereof.

28. The layer of claim 26, wherein the conductive material is graphite and the combination is a thickness of about 8 nm and a pattern with a fill area of about 50%.

29. The layer of claim 26, wherein the conductive material is gold and the combination is a thickness of about 50 nm and a pattern with a fill area of about 5%.

30. The layer of claim 26, wherein the conductive material is ITO and the combination is a thickness of about 100 nm and a pattern with a fill area of about 70%.
31. The layer of claim 26, wherein the conductive material is carbon nanotubes and the combination is a thickness of about 25 nm and a pattern with a fill area of about 70%.
32. The layer of claim 26, wherein the transparency is at least 65% and the electrical resistivity is less than 10^2 Ohms/square.
33. A method of forming a patterned layer with enhanced transparency comprising:
patterning a conductive material on a substrate at a combination of a thickness and a pattern, said combination determined by:
 computing an electrical conductivity and a visible absorption coefficient
 against a plurality of degrees of patterning and a plurality of material thicknesses.
34. The method of claim 33, wherein the conductive material is selected from the group consisting of graphite, gold, ITO, carbon nanotubes, and combinations and mixtures thereof.